



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

144. Proposed F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defiance, Ohio.

In a circular park 400 feet in diameter are four *equal* circular ponds of *variable* diameter. What is the probability that a sightless person walking in a straight line from the center of the park will step into a pond?

Solution by G. B. M. ZERR, A. M., Ph. D., Parsons, West Va.

In this solution we shall assume that a random radius (from center C of circular park of radius r) does not intersect more than one pond on the same side of the center. The required chance, p , then is four times the chance that a random radius will intersect a pond lying wholly upon the surface of a quadrant of the given circle.

Let P be center of pond, x its radius, θ =angle between tangents from C to pond, φ =angle at P between radii to points of contact. Let $CP=y$. Then $\theta=2\sin^{-1}(x/y)$, $\varphi=\frac{1}{2}\pi-2\sin^{-1}(x/y)$. The limits of x are 0 and $r(\sqrt{2}-1)=x'$; of y , $x\sqrt{2}$ and $r-x$.

$$\begin{aligned} \therefore p &= 4 \frac{\int_0^{x'} \int_{x\sqrt{2}}^{r-x} \theta \varphi \, dx dy}{\int_0^{x'} \int_{x\sqrt{2}}^{r-x} 2\pi \varphi \, dx dy} = 2\pi \int_0^{x'} \int_{x\sqrt{2}}^{r-x} \varphi \, dx dy \\ &= \frac{\pi}{2} \int^{x'} \left[\pi(r-x)^2 - 4(r-x)^2 \sin^{-1}\left(\frac{x}{r-x}\right) - 4x\sqrt{r^2-2rx} + 4x^2 \right] dx \\ &= \frac{\pi r^3}{18} (3\pi - 28 + 16\sqrt{2}). \\ \therefore p &= \frac{72}{\pi r^3 (3\pi - 28 + 16\sqrt{2})} \int_0^{x'} \int_{x\sqrt{2}}^{r-x} \theta \varphi \, dx dy \\ &= \frac{36}{\pi r^3 (3\pi - 28 + 16\sqrt{2})} \int_0^{x'} \left[\pi(r-x)^2 \sin^{-1}\left(\frac{x}{r-x}\right) + \pi x^2 + \pi x\sqrt{r^2-2rx} \right. \\ &\quad \left. - 4(r-x)^2 \left\{ \sin^{-1}\left(\frac{x}{r-x}\right) \right\}^2 - 9x\sqrt{r^2-2rx} \sin^{-1}\left(\frac{x}{r-x}\right) - 8x^2 \log\left(\frac{r-x}{x\sqrt{2}}\right) \right] dx \\ &= \frac{4}{(3\pi - 28 + 16\sqrt{2})} \left[4\sqrt{2} - 3 + \frac{8}{\pi} - \frac{8\sqrt{2}}{\pi} + \frac{8}{\pi} \log(2 - \sqrt{2}) \right]. \end{aligned}$$

MISCELLANEOUS.

138. Proposed by L. C. WALKER, A.M., Professor of Mathematics, Colorado School of Mines, Golden, Col.

Find an invariant of the *third degree* in the coefficients of a ternary cubic.